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Comparing online and on-campus students' perceptions of the digitalization of higher education institutions

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Abstract

Higher education institutions (HEIs) are facing significant progress in their digitalization. Covid-19 is an external affordance in which digitalization helps to secure social distance. Internal affordances are requirements to enhance the students' learning experience. We analyze students' attitudes toward the digitalization of their HEI based on empirical data from two groups of students within the same study program during the pandemic. Before the pandemic, the first group started on-campus and was forced into online teaching. The second group started online. Our results show that students, to a high degree, perceive harm in their learning success. At the same time, they have trust in the HEI's data handling. Generally, the group, which started online, shows a slightly higher negative perception. The differences between the two groups show a low to medium degree. Our work contributes to clarifying the impact of having to start studies online, which seems to be minor.

Keywords: *Higher education, organization, digitalization, learning, technology, covid-19*

1. Introduction

Even before the pandemic, teaching and learning were transformed by digital instruments at higher education institutions (HEIs) (Castro, 2019). Student assistance, administration procedures, the transfer of knowledge, and assessment have been increasingly digitalized. The digital infrastructure leads to constructive learning approaches, improves access to learning material and communication and collaboration across various interest groups. Digitalization is an increasing trend within education. HEIs have been experiencing difficulties in technology adoption. Due to the different demands of various stakeholders, complex requirements have hindered digitalization in HEIs (Reid, 2014). However, adoption became an imperative due to the Covid-19 pandemic.

The present paper aims to contribute to research on the current issues in digitalization. We aimed to determine the perceptions of the students during Covid-19. Some were forced into online teaching by the beginning, others during their studies. The working hypothesis is that there were differences between the perceptions of these two groups due to the compulsory acceleration of digitalization. Thus, the research question was determined as follows: How differently do students who started their studies on campus before the pandemic perceive the digitalization of their HEI compared to students who began online during the pandemic? Student perceptions were investigated based on the dimensions of trust, learning, and organizational culture.

The theoretical framework of the study is presented in the next section. Then, the research approach is presented, followed by a discussion of the findings. The paper ends with a short conclusion section, the implications, and the limitations of our research.

2. Digitalization of Higher Education Institutions

Educational digital technologies assist the lecturers in the improvement of learning resources and the analysis of learning goals (Vogelsang, Droit, & Liere-Netheler, 2019). Furthermore, digital processes accelerate service support. Digital technologies integrate instruction and administration. Thus, they lead to more transparent and transferrable student outcomes. Also, convergence could lead to more efficient processes. Since HEIs operate in an increasingly competitive environment, efficiency and competitive advantage become imperative (Adler & Harzing, 2017). Ubiquitous digital availability could lead to issues across the faculty and administrative staff (Proserpio & Gioia, 2007).

The employment of digital assets has been quite heterogeneous in higher education. Today, the pandemic forced HEIs to adopt and employ these assets (Mittal, Mantri, Tandon, & Dwivedi, 2021). Thus, we hypothesize a higher negative perception among the students forced into online teaching with digital assets as the starting point of our study.

Often, research has focused on the analysis of learning environments (Lapitan, Tiangco, Sumalinog, Sabarillo, & Diaz, 2021), the effects of students' individual learning achievements (Janson, Söllner, Bitzer, & Leimeister, 2014), or measurement of the success of the systems (Ouajdouni, Chafik, & Boubker, 2021). Besides the drivers and obstacles (Gregory & Lodge, 2015), studies provided recommendations for didactic learning element design (Tejedor, Cervi, Pérez-Escoda, Tusa, & Parola, 2021). Some studies tackled the organizational anchoring and adoption (Porter & Graham, 2016). Even the pandemic could not lead to significant operational responses across the HEIs (Miller, 2021). There is a certain resistance to change in HEIs, which is a factor in issues associated with the organizational digital technology integration (Al-Senaidi, Lin, & Poirot, 2009). The student experiences in digitalization are those of the users. Since they grew up as digital natives (Crittenden, Biel, & Lovely, 2019), they have been particularly critical of the digitalization of HEIs. They will probably be even more critical due to the enforcement during the pandemic. Furthermore, the effects of digitalization will remain with them in their professional careers (Friga, Bettis, & Sullivan, 2003).

3. Research Method and Sample

To measure the constraints associated with the Covid-19 pandemic, we used a questionnaire with 16 different items. The items take areas of potential concern in digitalization into account. Interestingly, the questionnaire was developed before the pandemic to capture students' general perceptions regarding the digitalization of their HEI. The participants rated statements on a Likert scale using a five-point range from "I do not agree at all" (1) to "I strongly agree" (5) (Brink, Packmohr, & Vogelsang, 2020). The pandemic allows measuring differences in students' perceptions in short time frames due to enforced digitalization. Thus, we judge the instrument to be valid for this use.

We collected two data sets during the pandemic within the bachelor's program in Media technology at Malmö University, Sweden. One course was on Digital Marketing (2nd semester) and the other on Introduction to Business (5th semester). The students of the Marketing course started their studies completely online. On the contrary, the students of the Introduction to Business experienced teaching on campus for at least their first and partly their second semester. Thus, the respondents from the two samples stem from different cohorts of students. Nevertheless, the two samples follow the same curriculum. Both courses have a workload of 15 ECTS aiming at a holistic perception of the fields taught. Thus, we collect a broad range of perceptions of different digitally conducted course elements. Class activities range from online lectures over digitally conducted workshops to office hours. Assignments within courses range from project work both individually and in groups to classical exams and working with case studies. Students' learning should lead to holistic evaluation and validation abilities. Currently, HEIs' digitalization of teaching is provoked

through an external effect. Before, administrative processes in Sweden were converted into contactless and digital services using personal tax numbers.

From the sample on Marketing, we received 83 completed questionnaires. From the sample on Introduction to Business, we received 73 completed questionnaires. Comparing both samples offers the chance to examine the change in students' perceptions between having a campus experience and having no campus experience. Thus, we assumed that the two samples' differences in response behavior should be observable based on the contrasting baseline conditions. However, it was uncertain whether there was an effect at all. To assess potential differences between the samples, we first analyzed the quantitative data. Then, we checked the normal distribution using the Shapiro-Wilk test and conducted a Mann-Whitney U test due to a missing normal distribution of the data. The Mann-Whitney U test compares the medians of two samples and indicates if there are significant divergences. Also, the degree of the differences can be calculated as an effect size (Pallant, 2005).

4. Results and Discussion

The following table 1 shows the results from the sample in which the students started online and in which the students started on campus. During both time points of the data collections, the students were taught online. To understand the impact of having to start a study program online or on campus, we compare both samples' statements' means ($\bar{x}$) and standard deviations (s). We calculate the differences ($\Delta\ \bar{x}$) between the mean results of these two samples to make the differences visible.

Regarding the characteristic of changed learning, the online sample shows a higher fear of harm in its learning success and a lower standard deviation, indicating a more homogenous perception within the sample. A non-advantageous digital learning platform triggers the online sample slightly higher than the on-campus sample. Still, the perception is towards the non-agreeing side of the scale. Both samples emphasize a rather high and similar degree of classical methods of teaching conducted digitally. Thus, the students do not perceive a clear digital progression within the teaching by their HEI. The perception of the non-availability of resources is higher within the online sample. Generally, in other characteristics, the deltas are rather small. Within the characteristic strategy, the perception of the online sample is more inclined to agree less with the university's efforts. Both samples show a high perception of trust for adequate data handling and do not expect a negative effect on their usage of online resources because of more increased transparency.

We analyzed whether the observed differences in means between the two samples were statistically significant (sig.) by applying the Mann-Whitney U test (MWU) (Pallant, 2005). We also calculated the effect size (r) to determine the magnitude of the differences. The effect

strength is a measure that indicates the overlap of two samples. A high value implies a low overlap of the samples and vice versa (Fritz, Morris, & Richler, 2012).

Table 1. Mean Values, Standard Deviation, and MWU test.

Charac-teristic	Statements in keywords	Started online		Started on campus		Δ x̄	MWU test	
		x̄	s	x̄	S		Sig.	r
Changed Learning	Harms learning success	3.66	1.05	2.71	1.30	0.95	0.00	-0.37
	No advantages of the digital learning platform	2.73	0.91	2.48	0.94	0.25	0.15	-0.11
	Same methods for teaching & services	3.78	0.87	3.84	0.83	-0.06	0.70	-0.03
Changed Services	Services offered digitally	3.72	1.00	3.84	1.04	-0.12	0.44	-0.06
	Processes digitized	3.63	0.90	3.68	0.96	-0.05	0.83	-0.01
Cultural Change	Same learning culture	2.80	1.07	2.93	1.19	-0.13	0.40	-0.06
	Constant learning to transform digitally	3.39	0.87	3.58	0.92	-0.19	0.01	-0.13
	New ideas in teaching	3.75	1.08	3.97	0.96	-0.22	0.22	-0.10
Digital Resources	Position for digitalization	3.20	0.97	3.30	0.86	-0.1	0.60	-0.04
	No resources for the digital learning platform	3.07	1.18	2.62	1.15	0.45	0.01	-0.20
Digital Strategy	HEI moves forward	3.65	0.88	3.99	0.97	-0.34	0.01	-0.21
	Management supports	3.65	0.82	3.78	0.86	-0.13	0.22	-0.10
	HEI has vision / strategy	2.92	0.98	3.24	0.88	-0.32	0.02	-0.19
Trust	Control of data storage	2.61	0.99	2.88	1.22	-0.27	0.21	-0.10
	Trust in data handling	4.12	1.04	4.26	0.90	-0.14	0.50	-0.05
	No effect of transparency on platform usage	4.20	0.92	4.15	1.08	0.05	0.96	-0.01

Source: Cf. (Brink et al., 2020) for exact wordings of the items

Results in table 1 show a moderate difference in the perceived harm to learning success, which is significant. Other low-moderate significant differences concern the non-availability of resources and the aspects concerning the strategy of the HEI. To examine whether further factors cause differences, we tested the influence of other variables on the response behavior.

The variables were age and final grade. We tested by using Spearman's rank correlation coefficient (Ratner, 2009). Furthermore, we tested for differences in gender by using the Mann-Whitney U test (Pallant, 2005). However, we did not observe any significant effects of the aforementioned factors on the response behavior.

Comparing both samples clearly shows a negative trend in the characteristic changed learning. Students who started online believe that the change harms their learning success, with the highest delta of 0.95. Also, they perceive the digital learning platform as slightly less advantageous. Previous studies comparing pre- and intra-covid data conclude that online learning harms learning success according to students' perceptions (Packmohr & Brink, 2021). With this study, we can broaden the perspective, as even students, who did not experience the change in the same way as the students who have started their education on campus, perceive stronger harm to their learning success. On the contrary, other studies prove better student performance during the pandemic (Gonzalez et al., 2020). Education in this study program focuses on problem-based learning. Students have assignments with rather low contact hours. Often, these assignments are conducted in groups. Thus, it seems important for learning success to find the right peers (Nerantzi, 2020). Having started on campus allows students to find the right peers better and form working groups. Regarding other characteristics, this pattern is prevalent. The students who started online-only are inclined toward a more negative perception. In general, we expected a greater difference in the samples, as the experiences and study durations of the samples are rather different, and a pandemic is a complex experience. Not all students are equally affected (Aucejo, French, Ugalde Araya, & Zafar, 2020).

5. Conclusions and Limitations

Our study investigates students' perception of the digitalization of their HEIs. To research differences in perception, we surveyed two batches of students in the same program of Media technology studies. Both batches started with different conditions (completely online and entirely on campus) but faced an online education at the time point of the intra-pandemic data collections. The batches are at various stages of their education. Although the university conducted online teaching, state regulations were formulated as recommendations and barely enforced.

The results show a slightly more negative perception of the students who started online on different aspects of their HEI's digitalization. By testing the correlation of other variables without significance, we can exclude the effect of gender, age, and study results. Especially, the non-significance effects of the study results indicate that students might overestimate their harm in learning success. The Mann-Whitney U test shows low to moderate effects, which means a relatively high overlap between the two samples. This overlap limits the

generalizability of our study. The homogeneity between the two samples might be too high, as they study the same program. The students who started on campus are more advanced in their studies but have taken the same courses as those who began online only. Thus, future data collections could survey a group of students from another program as a comparison. Future statistical data analyses could apply ordered probit regression to stay within the ordinal Likert scale (Della Lucia, Minim, Silva, Minim, & Cipriano, 2013).

Sweden abolished all restrictions by the beginning of February 2022, and the programs will gradually go back to campus. It will be interesting to follow up with the students who do not have an on-campus experience. This gives the chance to observe possible changes within their perceptions.

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